Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Previously Submitted): A vapor delivery system for delivering a controlled flow of vapor sublimated from a solid material to a vacuum chamber , comprising the combination of a heated vaporizer for the solid material operable at sub atmospheric pressure and a vapor delivery passage from the vaporizer to the vacuum chamber, the vapor delivery passage including a throttle valve followed by a vapor conduit a pressure gauge that is responsive to sub atmospheric pressure being located between the throttle valve and the vapor conduit, surfaces of the vapor delivery passage that are exposed to the sublimed vapor, including such surfaces of the throttle valve, the pressure gauge and the vapor conduit, being adapted to be held at temperature above the condensation temperature of the solid material, and a closed-loop control system incorporating the pressure gauge being constructed to vary the conductance of the throttle valve to control the sub atmospheric pressure of the vapor downstream of the throttle valve in response to the output of the pressure gauge, flow of vapor to the vacuum chamber thereby being determined by pressure of the vapor in the region of the passage between the throttling valve and the vapor conduit .

Claims 2-27 (Canceled).

Claim 28 (Previously Submitted): The vapor delivery system of claim 1 including a temperature controlling system adapted to hold the temperatures of the surfaces of the delivery passage above the temperature of the vaporizer.

Claim 29 (Previously Submitted): The vapor delivery system of claim 28 having multiple stages of the vapor delivery passage adapted to be held at progressively higher temperatures, the more distant the stages are from the vaporizer.

Claim 30 (Previously Submitted) The system of claim 1 wherein the vapor flow rate is adapted to be determined by both a control system for the temperature of the vaporizer and said control system for the conductance of the throttle valve.

Claim 31 (Previously Submitted): The system of claim 1 wherein the temperature of the vaporizer is determined by closed-loop control to a set-point temperature.

Claim 32 (Previously Submitted): The vapor delivery system of claim 1 in which the maximum N2 conductance of the throttle valve is at least 1 liter per second.

Claim 33 (Previously Submitted): The vapor delivery system of claim 1 in which the pressure drop across the throttle valve when the valve is operationally fully open is less than 100 mTorr.

Claim 34 (Previously Submitted): The vapor delivery system claim 1 in which the maximum conductance of the throttle valve is at least 5 times the conductance of the vapor conduit.

Claim 35 (Previously Submitted): The vapor delivery system of claim 1 in which the maximum conductance of the throttle valve is at least 10 times the conductance of the vapor conduit.

Claim 36 (Previously Submitted): The vapor delivery system of claim 1 in which said throttle valve is a variable-position gate valve.

Claim 37 (Previously Submitted): The vapor delivery system of claim 1 in which said throttle valve is of the butterfly type.

Claim 38 (Previously Submitted): The vapor delivery system of claim 37 in which the useful dynamic range of the butterfly valve, between lowest and highest conductance, is about a factor of 10.

Claim 39 (Previously Submitted): The vaporizer delivery system of claim 1 constructed to operate with a rechargeable fixed charge of solid material which is progressively consumed in a manner to reduce the vapor-emitting area of the solid material, and constructed, in response to a decrease in pressure beyond the throttle valve, to reset the position of the throttle valve to recover the desired flow, and also from time to time, as the throttle valve nears its maximum useful conductance, to elevate the temperature of the vaporizer to raise the pressure in the vaporizer and enable the throttle valve to operate within its preferred conductance dynamic range.

Claim 40 (Previously Submitted): The vapor delivery system of claim 39 in which said throttle valve is of the butterfly type.

Claim 41 (Previously Submitted): The vaporizer delivery system of claim 39 in combination with a throttle valve-based sensing and control system capable of providing a vaporizer set-point temperature value to a regulator of a vaporizer heater that is capable of maintaining the vaporizer temperature at the set-point, the sensing and control system storing at least one predetermined valve displacement value representing a desired upper conductance limit for the throttle valve, the sensing and control system constructed to monitor the position of the throttle valve, and upon detecting the valve nearing or reaching that displacement value, the sensing and controller system constructed to raise the set-point temperature value to the regulator heater to cause increased vapor generation and vapor pressure upstream of the throttle valve, thereby to enable the closed loop control of the throttle valve to cause the valve to return to a substantially lower conductance position.

Claim 42 (Previously Submitted): The vapor delivery system of claim 41 in which said throttle valve is of the butterfly type.

Claim 43 (Previously Submitted): The vaporizer delivery system of claim 41 including a reference table of predetermined increments of temperature rise suitable for operation, and the sensing and control system effective, upon detecting the valve nearing or reaching said

displacement value, to cause the vaporizer temperature set-point to be incremented to the next step in the reference table.

Claim 44 (Previously Submitted): The vapor delivery system of claim 1 constructed and arranged to deliver ionizable vapor to an ion source.

Claim 45 (Previously Submitted): The vapor delivery system of claim 41 constructed and arranged to deliver ionizable vapor to the ion source of an ion implanter.

Claim 46 (Previously Submitted): The vapor delivery system of claim 1 constructed and arranged to deliver vapor to a work piece processing vacuum chamber.

Claim 47 (Previously Submitted): The vapor delivery system of claim 43 constructed and arranged to deliver ionizable vapor to a process chamber for dosing semiconductors.

Claim 48 (Previously Submitted): The vapor delivery system of claim 1 constructed to convey its vapor to a high vacuum, the system constructed to respond to decrease in sub atmospheric pressure downstream of the throttle valve to increase the temperature of the vaporizer.

Claim 49 (Previously Submitted): The vapor delivery system of claim 1 in which the control system for the throttle valve includes a servo loop which adjusts the position of the throttle valve in response to the output signal of the pressure gauge to maintain said downstream vapor pressure at said gauge to a set-point value.

Claim 50 (Previously Submitted): The vapor delivery system of claim 1 in which the vaporizer is constructed to contain and evaporate decaborane, $B_{10}H_{14}$.

Claim 51 (Previously Submitted): The vapor delivery system of claim 1 in which the vaporizer is constructed to contain and evaporate octadecaborane, $B_{18}H_{22}$.

Claim 52 (Previously Submitted): The vapor delivery system of claim 1 in which the vaporizer is constructed to contain and evaporate indium trichloride, InC_3.

Claim 53 (Previously Submitted): The vapor delivery system of claim 1 in which the vaporizer is constructed to contain and evaporate trimethyl indium, $In(CH_3)_3$.

Claim 54 (Previously Submitted): The vapor delivery system of claim 1 in which the vaporizer is constructed to contain and evaporate triethyl antimony, $Sb(C_2H_5)_3$.

Claim 55 (Previously Submitted): A method of delivering to a vacuum chamber a controlled flow of vapor sublimated from a solid material conducted by use of the vapor delivery system of claim 1.

Claim 56 (Previously Submitted): The method of claim 55 in which the throttle valve employed in the vapor delivery system is of the butterfly type.

Claim 57 (Previously Submitted): The method of claim 56 in which the useful dynamic range of the butterfly valve, between lowest and highest conductance, is about a factor of 10.

Claim 58 (Previously Submitted): A method of producing an ion beam in a vacuum chamber conducted by use of the vapor delivery system of claim 44 to deliver a controlled ionizable flow of vapor sublimated from a solid material to an ionization chamber.

Claim 59 (Previously Submitted): The method of claim 58 employing a vapor delivery system wherein the vapor flow rate is adapted to be determined by both a control system for the temperature of the vaporizer and said control system for the conductance of the throttle valve.

Claim 60 (Previously Submitted): The method of claim 58 employing a vapor delivery system in which said throttle valve is of the butterfly type.

Claim 61 (Previously Submitted): The method of claim 58 employing a vapor delivery system constructed to operate with a rechargeable fixed charge of solid material which is progressively consumed in a manner to reduce the vapor-emitting area of the solid material, and constructed, in response to a decrease in pressure beyond the throttle valve, to reset the position of the throttle valve to recover the desired flow, and also from time to time, as the throttle valve nears its maximum useful conductance, to elevate the temperature of the vaporizer to raise the pressure in the vaporizer and enable the throttle valve to operate within its preferred conductance dynamic range.

Claim 62 (Previously Submitted): The method of claim 61 employing a vapor delivery system having a throttle valve-based sensing and control system capable of providing a vaporizer set-point temperature value to a regulator of a vaporizer heater that is capable of maintaining the vaporizer temperature at the set-point, the sensing and control system storing at least one predetermined valve displacement value representing a desired upper conductance limit for the throttle valve, the sensing and control system constructed to monitor the position of the throttle valve, and upon detecting the valve nearing or reaching that displacement value, the sensing and controller system constructed to raise the set-point temperature value to the regulator heater to cause increased vapor generation and vapor pressure upstream of the throttle valve, thereby to enable the closed loop control of the throttle valve to cause the valve to return to a substantially lower conductance position..

Claim 63 (Previously Submitted): The method of claim 58 employed to delivery ionizable vapor to the ion source of an ion implanter.

Claim 64 (Previously Submitted): A control system for controlling a vapor delivery system for delivering a controlled flow of vapor sublimated from a solid material to a vacuum chamber, the vapor delivery system comprising the combination of a heated vaporizer for the solid material operable at sub atmospheric pressure and a vapor delivery passage from the vaporizer to the vacuum chamber, the vapor delivery passage including a throttle valve followed by a vapor conduit, a pressure gauge that is responsive to sub atmospheric pressure being located between the throttle valve and the vapor conduit, surfaces of the vapor delivery passage that are exposed

to the sublimed vapor, including such surfaces of the throttle valve, the pressure gauge and the vapor conduit, being adapted to be held at temperature above the condensation temperature of the solid material, and a closed-loop control system incorporating the pressure gauge being constructed to vary the conductance of the throttle valve to control the sub atmospheric pressure of the vapor downstream of the throttle valve in response to the output of the pressure gauge, flow of vapor to the vacuum chamber thereby being determined by pressure of the vapor in the region of the passage between the throttling valve and the vapor conduit,

wherein the control system is constructed to operate with a rechargeable fixed charge of solid material which is progressively consumed in a manner to reduce the vapor-emitting area of the solid material, and constructed, in response to a decrease in pressure beyond the throttle valve, to reset the position of the throttle valve to recover the desired flow, and also from time to time, as the throttle valve nears its maximum useful conductance, to elevate the temperature of the vaporizer to raise the pressure in the vaporizer and enable the throttle valve to operate within its preferred conductance dynamic range.

Claim 65 (Previously Submitted): The control system of claim 64 in combination with a throttle valve-based sensing and control system capable of providing a vaporizer set-point temperature value to a regulator of a vaporizer heater that is capable of maintaining the vaporizer temperature at the set-point, the sensing and control system storing at least one predetermined valve displacement value representing a desired upper conductance limit for the throttle valve, the sensing and control system constructed to monitor the position of the throttle valve, and upon detecting the valve nearing or reaching that displacement value, the sensing and controller system constructed to raise the set-point temperature value to the regulator heater to cause increased vapor generation and vapor pressure upstream of the throttle valve, thereby to enable the closed loop control of the throttle valve to cause the valve to return to a substantially lower conductance position.

Claim 66 (Previously Submitted): The control system of claim 65 including a reference table of predetermined increments of temperature rise suitable for operation, and the sensing and control system effective, upon detecting the valve nearing or reaching said displacement value,

to cause the vaporizer temperature set-point to be incremented to the next step in the reference table.